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PATENTS

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Applicants: Donald R. Huffman  
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INFORMATION DISCLOSURE STATEMENT

Sir:

In accordance with the duty of disclosure under 37 C.F.R. §§1.56, 1.97 and 1.98, applicants, are making a record of art for consideration by the United States Patent and Trademark Office. The art is listed on the accompanying PTO 1449 form, the contents of which are incorporated by reference. The art is also listed hereinbelow:

U.S. Patent No. 4,132,671

U.S. Patent No. 3,317,354

U.S. Patent No. 4,922,827

U.S. Patent No. 5,132,105

U.S. Patent No. 4,915,977

U.S. Patent No. 4,767,608

CERTIFICATE OF MAILING UNDER 37 C.F.R. 1.8(a)

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Dated: March 4, 1997

Mark J. Cohen

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U.S. Patent No. 4,435,378

U.S. Patent No. 2,957,756

U.S. Patent No. 4,435,375

U.S. Patent No. 2,635,994

U.S. Patent No. 3,009,783

U.S. Patent No. 3,172,774

U.S. Patent No. 4,167,444

U.S. Patent No. 5,114,477

U.S. Patent No. 5,234,474

UK Patent Appln. No. GB 2 101 983 A

Japanese Patent Appln. No. 2-160696

Japanese Patent Appln. No. 2-221194

Russian Patent No. 1,587,000

West German Patent No. 2,414,215

Aihara et al., Spherical Aromaticity of Buckminsterfullerene, Bull. Chem. Soc. Jpn., 61, 1988, pp. 2657-2659

Akhter, et al., The Structure of Hexane Soot II: Extraction Studies, Applied Spectroscopy, 39(1), 1985, pp. 154-167

Almlof et al., Theoretical Methods and Results for Electronic Structure Calculations on Very Large Systems Carbon Clusters, ACS Symposium Series, 353, 1987, pp. 35-48

Amato, A First Sighting of Buckyballs in the Wild, Science, 257(5067), 1992, p. 167

Amic et al., On the Lack of Reactivity of Buckminsterfullerene: A Theoretical Study, J. Chem. Soc. Perkin Trans., 1990, pp. 1595-1598

Bacon, R., J. Applied Physics, 31(2), 1960, pp. 283-290

Balasubramanian et al., Computer Generation of Spectra of Graphs: Applications to  $C_{60}$  Clusters and Other Systems, Journal of Computational Chemistry, 9(4), 1988, pp. 406-415

Ballester et al., Atoms in Carbon Cages as a Source of Interstellar Diffuse Lines, The Astrophysical Journal, 356, 1990, pp. 507-512

Blau et al., An Investigation of the Microfrictional Behavior of  $C_{60}$  Particle Layers on Aluminum, Thin Solid Films, 219, 1993, pp. 129-134

Bloomfield et al., Negative and Positive Cluster Ions of Carbon and Silicon, Chemical Physics Letters, 121(1)(2), 1985, pp. 33-37

Bochvar et al., Problems in the Structural Chemistry of Crystalline Carbon, Sov. Sci. Rev. B. Chem., 9, 1987, pp. 483-527

Brendsdaal et al., Normal Coordinate Analysis of "Footballene"  $C_{60}$ , Spectroscopy Letters, 21(4), 1988, pp. 313-318

Brendsdaal, Symmetry Coordinates of Molecular Vibrations of "Footballene"  $C_{60}$ , Spectroscopy Letters, 21(4), 1988, pp. 319-339

Brendsdaal et al., Kekule Structures of Footballene, Journal of Molecular Structure (Theochem), 1989, pp. 55-66

Brown, High Symmetries in Quantum Chemistry, Chemical Physics Letters, 136(2), 1987, pp. 128-133

Buseck et al., Fullerenes from the Geological Environment, Science, 257(5067), 1992, pp. 215-217

Bussoletti, Dusty Objects in the Universe, pp. 89-93

Campbell et al., An Intense, Simple Carbon Cluster Source, J. Chem. Phys., 93(9), 1990, pp. 6900-6907

Caulemans et al.,  $SO(4)$  Symmetry and the Static Jahn-Teller Effect in Icosahedral Molecules, Physical Review A, 39(2), 1989, pp. 481-493

Caulemans et al., The Jahn-Teller Instability of Fivefold Degenerate States in Icosahedral Molecules, J. Chem. Phys., 93(2), 1990, pp. 1221-1234

Coulantbeau et al., Calculs de Proprietes Electroniques et des Frequences Normales de Vibration D'Agregats Carbones Formant Des Polyedres Reguliers et Semi-Reguliers, Journal de chimie physique, 84, 1987, pp. 7-8

Cox et al.,  $C_{60}$ La: A Deflated Soccer Ball?, J. Am. Chem. Soc., 108, 1986, pp. 2457-2458

Cox et al., Carbon Clusters Revisited: The "Special" Behavior of  $C_{60}$  and Large Carbon Clusters, J. Chem. Phys., 88(3), 1988, pp. 1588-6907

Creasy, Some Model Calculations of Carbon Cluster Growth Kinetics, J. Chem. Phys., 92(12), 1990, pp. 7223-7233

Creasy et al., Large Carbon Cluster Ion Formation by Laser Ablation of Polyamide and Graphite, Chemical Physics, 126, 1988, pp. 453-468

Creasy et al., Formation of High Mass Carbon Cluster Ions from Laser Ablation of Polymers and Thin Carbon Films, J. Chem. Phys., 92(4), 1990, pp. 2269-2277

Curl et al., Probing  $C_{60}$ , Science, 242, 1988, pp. 1017-1022

Curl et al., Fullerenes, Scientific America, 1991, pp. 54-64

Cyvin et al., Molecular Vibrations of Footballene, Chemical Physics Letters, 143(4), 1988, pp. 377-380

Daniel, Jr., Studies Toward a Convergent Synthesis of  $C_{60}$ , Dissertation Abstracts International, 49(5), 1988, p. 1706-B

Dias, A Facile Huckel Molecular Orbital Solution of Buckminsterfullene Using Chemical Graph Theory, Journal of Chemical Education, 66(12), 1989, pp. 1012-1015

Dietz et al., Laser Production of Supersonic Metal Cluster Beams, J. Chem. Phys., 74(1), 1981, pp. 6511-6512

Disch et al., On Symmetrical Clusters of Carbon Atoms:  $C_{60}$ , Chemical Physics Letters, 125(5)(6), 1986, pp. 465-466

Ebbesen, et al., Origins of Fullerenes in Rocks, Science, 268, 1995, pp. 1634-1635

Elser et al., Magnetic Behavior of Icosahedral  $C_{60}$ , Physical Review of General Physics Third Series, 36(10), 1987, pp. 4579-4585

Elser et al., Icosahedral  $C_{60}$ : An Aromatic Molecule with a Vanishingly Small Ring Current Magnetic Susceptibility, Nature, 325, 1987, pp. 792-794

Feld et al., Carbon Cluster Emission from Polymers Under Kiloelectronvolt and Megaelectronvolt Ion Bombardment, J. Phys. Chem., 94, 1990, pp. 4595-4599

Feng et al., Quantum-Chemical Investigation of Buckminsterfullerene and Related Carbon Clusters (I): The Electronic Structure and UV Spectra of Buckminsterfullerene and Other  $C_{60}$  Cages, International Journal of Quantum Chemistry, XXXVII, 1990, pp. 509-607

Fowler et al.,  $\pi$ -Systems in Three Dimensions, Chemical Physics Letters, 127(1), 1986, pp. 78-83

Fowler, Carbon Cylinders: A Class of Closed-shell Clusters, J. Chem. Soc. Faraday Trans., 86(2), 1990, pp. 2073-2077

Fowler, How Unusual is  $C_{60}$ ? Magic Numbers for Carbon Clusters, Chemical Physics Letters, 131(6), 1986, pp. 444-450

Fowler et al., Systematics of Bonding in Non-Icosahedral Carbon Clusters, Theor. Chim. Acta, 73, 1988, pp. 1-26

Fowler et al., Electric and Magnetic Properties of the Aromatic Sixty-Carbon Cage, Chemical Physical Letters, 165(1), 1990, pp. 79-86

Fowler et al., The Leapfrog Principle: A Rule for Electron Counts of Carbon Clusters, J. Chem. Soc., Chem. Commun., 1987, pp. 1403-1405

Gerhardt et al., Polyhedral Carbon Ions in Hydrocarbon Flames, Chemical Physical Letters, 137(4), 1987, pp. 306-310

Gerhardt et al., The Formation of Polyhedral Carbon Ions in Fuel-Rich Acetylene and Benzene Flames, Twenty-Second Symposium (International) on Combustion/The Combustion Institute, 1988, pp. 395-401

Gerhardt et al., Large Ionic Species in Sooting Acetylene and Benzene Flames, AGARD Proc. No. 422, Combustion and Fuels in Gas Turbine Origins, 1988, p. 22-1-22-11

Gerhardt et al., Polyhedral Carbon Ions in Hydrocarbon Flames, Chemical Physics Letters, 137(4), 1987, pp. 306-310

Gerhardt et al., The Formation of Polyhedral Carbon Ions in Fuel-Rich Acetylene and Benzene Flames, Twenty-Second Symposium (International) on Combustion/The Combustion Institute, 1988, pp. 395-401

Geusic et al., Photodissociation of Carbon Cluster Cations, J. Chem. Phys., 86(7), 1987, pp. 3862-3869

Haddon, Measure of Nonplanarity in Conjugated Organic Molecules: Which Structurally Characterized Molecule Displays the Highest Degree of Pyramidalization?, J. Am. Chem. Soc., 112, 1990, pp. 3385-3389

Haddon et al., Electronic Structure and Bonding in Icosahedral  $C_{60}$ , Chemical Physics Letters, 125(5)(6), 1986, pp. 459-464

Haddon et al., Icosahedral  $C_{60}$  Revisited: An Aromatic Molecule with a Vanishingly Small Ring Current Magnetic Susceptibility, Chemical Physics Letters, 169(4), 1990, pp. 362-364

Haddon et al., Rehybridization and  $\pi$ -Orbital Alignment: The Key to the Existence of Spheroidal Carbon Clusters, Chemical Physics Letters, 131(3), pp. 165-169.

Hahn et al., Magic Numbers in  $C^+_N$  and  $C_N$  Abundance Distributions, Chemical Physics Letters, 130(1)(1), 1986, pp. 12-16

Hale, Discrete-Variational-X Alpha Electronic Structure Studies of the Spherical  $C_{60}$  Cluster: Prediction of Ionization Potential and Electronic Transition Energy, J. Am. Chem. Soc., 108, 1986, pp. 6087-6088

Harano et al., Decomposition of Gaseous Hydrocarbons in a Laser-induced Plasma as a Novel Carbonaceous Source for Cluster Formation, Chemical Physics Letters, 172(3)(4), 1990, pp. 219-223

Hargittai et al., Quasicrystals, Networks and Molecules of Fivefold Symmetry, pp. 239-287

Harter et al., Rovibrational Spectral Fine Structure of Icosahedral Molecules, Chemical Physics Letters, 132(4)(5), 1986, pp. 387-392

Harter et al., Rotation-Vibration Spectra of Icosahedral Molecules. I. Icosahedral Symmetry Analysis and Fine Structure, J. Chem. Phys. 90(9), 1089, pp. 4727-4743

Hayden et al.,  $\pi$  Bonding in the Icosahedral  $C_{60}$  Cluster, Physical Review B, 36(9), 1987, pp. 5010-5015

Haymet,  $C_{120}$  and  $C_{60}$ : Archimedean Solids Constructed from  $sp^2$  Hybridized Carbon Atoms, Chemical Physics Letters, 122(5), 1985, pp. 421-424

Haymet, Footballene: A Theoretical Prediction for the Stable, Truncated Icosahedral Molecule  $C_{60}$ , J. Am. Chem. Soc., 108, 1986, pp. 319-321

Heath, The Formation of Long Carbon Chain Molecules during Laser Vaporization of Graphite, J. Am. Chem. Soc., 109, 1987, pp. 359-363

Heath et al., Long Carbon Chain Molecules in Circumstellar Shells, The Astrophysical Journal, 314, 1987, pp. 352-355

Heath et al., Lanthanum Complexes of Spheroidal Carbon Shells, J. Am. Chem. Soc., 107, 1985, pp. 7779-7780

Heath et al., The UV Absorption Spectrum of  $C_{60}$  (buckminsterfullerene): A Narrow Band at 3860 Å, J. Chem. Phys., 87(7), 1987, pp. 4236-4238

Hecht, ...and shower the Earth with buckyballs, Science, 1994, pp. 16

Hess, Jr. et al., The Stability of Footballene, J. Org. Chem., 1986, pp. 3902-3903

Heymann, et al., Fullerenes in the Cretaceous-Tertiary Boundary Layer, Science, 265, 1994, pp. 645-647  
Heymann, Buckminsterfullerene, its Siblings, and Soot, Carriers of Trapped Inert Gases in Meteorites?, Proceedings of the Seventeenth Lunar and Planetary Science Conference, Part 1, Journal of Geophysical Research, 91(B13), 1986, pp. E135-E138

Huffman, Methods and Difficulties in Laboratory Studies of Cosmic Dust Analogues, in Experiments on Cosmic Dust Analogues, Edited by Bussoletti et al., 1988, pp. 25-42

Hollow Molecules, New Scientist, 1966, pp. 118-119

Howard et al., Fullerenes C<sub>60</sub> and C<sub>70</sub> in Flames, Letters to Nature, 352, 1992, pp. 139-141

Huffman, D., et al., Nature (Phys. Sci.), 243, 1973, pp. 50-51

Huffman, D., "Methods and Difficulties in Laboratory Studies of Cosmic Dust Analogues", in book "Experiments on Cosmic Dust Analogues", Bussoletti, E., Editor, Kluwer Academic Publishers, Boston MA, 1988, pp. 25-42

Iijima, The 60-Carbon Cluster Has Been Revealed?, J. Phys. Chem., 91, 1987, pp. 3466-3467

Jelski et al., Clusters: Link Between Molecules and Solids, Journal of Chemical Education, 65(10), 1988, pp. 879-883

Jiang et al., Stability and Reactivities Based on Moment Analysis, Theor. Chim. Acta, 75, 1989, pp. 279-297

Joblin et al., Detection of Diffuse Interstellar Bands in the Infrared, Nature, 346, 1990, pp. 729-731

Kaldor et al., Molecular Surfaces: Chemistry and Physics of Gas Phase Clusters, Microclusters: Proceedings of the First NEC Symposium, 1987, pp. 96-106

Kaldor et al., The Basics of Molecular Surfaces, Chemtech, 1987, pp. 300-307

Kamo, Mutsukazu et al., Diamond Synthesis from Gas Phase in Microwave Plasma, Journal of Crystal Growth, 62, 1983, pp. 642-644

Kappler, P., "Fine Carbon Particle Formation by Carbon Vapor Condensation", J. Applied Phys., 50(1), 1979, pp. 308-316

Kataoka et al., Geometrical Structures and Spectra of Corannulene and Icosahedral  $C_{60}$  Tetrahedron, 42(23), pp. 6437-6442

Keller, Der  $C_{60}$  Cluster Footballen oder Buckminsterfullerene, GIT. Fachz. Lab., 31, 1987, pp. 619-623

Kirk-Othmer, Encyclopedia of Chemical Technology, Third Edition, Volume 4, Blood, Coagulants and Anticoagulants to Cardiovascular Agents, pp. 652-653

Klein et al., Icosahedral Symmetry Carbon Cage Molecules, Nature, 323, 1986, pp. 703-706

Klein et al., Resonance in  $C_{60}$  Buckminsterfullerene, J. Am. Chem. Soc., 108, 1986, pp. 1301-1302

Kovaoevic, et al., On the Hybridization in Some Archimedean Carbon Clusters, International Journal of Quantum Chemistry Symposium 21, 1987, pp. 589-593

Kratschmer, W., et al., "Search for the UV and IR Spectra of  $C_{10}$ ..." in "Dusty Objects in the Universe: Proceedings of the 4th Int. Workshop of the Astron. Observatory held at Capri, Italy, 1989

Kratschmer et al., The Infrared and Ultraviolet Absorption Spectra of Laboratory-Produced Carbon Dust: Evidence for the Presence of the  $C_{60}$  Molecule, Chemical Physics Letters, 170(2)(3), 1990

Kratschmer, W., et al., Chem. Phys. Lett., 170(2)(3), 1990, pp. 167-170

Kratschmer, W., et al., Surface Science, 156, 1985, pp. 814-821

Kratschmer and No. Sorg, Spectroscopy of Matrix-Isolated Carbon Cluster Molecules Between 200 and 850 nm Wavelength, Surface-Science, 156, 1985, pp. 814-821

Kratschmer et al., Search for the UV and IR Spectra of  $C_{60}$  in Laboratory-Produced Carbon Dust, Dusty Objects in the Universe, 1990, pp. 89-93

Kroto, The Formation and Structure of Circumstellar and Interstellar Dust, Carbon in the Galaxy: Studies from Earth and Space, NASA Conference Publication 3061, pp. 275-284

Kroto et al., The Formation of Quasi-Icosahedral Spiral Shell Carbon Particles, Nature, 331, 1988, pp. 328-331

Kroto et al.,  $C_{60}$ : Buckminsterfullerene, Nature, 318, 1985, pp. 162-163

Kroto, Giant Fullerenes, Chemistry in Britain, 1980, pp. 40-45



Kroto, The Chemistry of the Interstellar Medium, Phil. Trans. R. Soc. Land. A, 325, 1988, pp. 405-421

Kroto et al., C<sub>60</sub>: Buckminsterfullerene, Nature, 318, 1985, pp. 162-163

Kroto, C<sub>60</sub> Fullerenes, Giant Fullerenes and Soot, Pure & Appl. Chem., 62(3), 1990, pp. 407-415

Kroto, Giant Fullerenes, Chemistry in Britain, 1990, pp. 40-43

Kroto, The Role of Linear and Spheroidal Carbon Molecules in Interstellar Grain Formation, Ann. Phys. Fr., 14, 1989, pp. 169-179

Kroto, The Stability of the Fullerenes C<sub>n</sub>, with n=24, 28, 32, 36, 50, 60 and 70, Nature, 329, 1987, pp. 529-531

Kroto, Space, Stars, C<sub>60</sub> and Soot, Science, 242, 1988, pp. 1139-1145

Kroto, Chains and Grains in Interstellar Space, Polycyclic Aromatic Hydrocarbons and Astrophysics, pp. 197-206

Kurihara, et al., High rate synthesis of diamond by dc plasma jet chemical vapor deposition, Appl. Phys. Lett., 52(6), 1988, pp. 437-438

Larsson et al., OPTICAL SPECTRUM OF THE ICOSAHEDRAL C<sub>60</sub>- "FULLERENE-60", Chemical Physical Letters, 137(6), 1987, pp. 501-503

Laszlo et al., A Study of the UV Spectrum of the Truncated Icosahedral C<sub>60</sub> Molecule, Journal of Molecular Structure (Theochem), 183, 1989, pp. 271-278

Laszlo et al., On the Geometrical Structure and UV Spectrum of the Truncated Icosahedral C<sub>60</sub> Molecule, Chemical Physics Letters, 136(5), 1987, pp. 418-422

Lefeuvre, J., Etude de Poussieres de Fer et de Carbone, Tome 30, Annee 1967, Fasc. 4, pp. 731-738

Lefevre, An Experimental Study of the Dust of Iron, Carbon, Silicon Carbide and Silica, Astron. & Astrophys., 5(1), 1970, pp. 37-44

Lefevre, J., Astron. Astrophys., 5, 1970, p. 37 and pp. 39-44

Leger et al., Remarkable Candidates for the Carrier of the Diffuse Interstellar Bands: C<sub>60</sub><sup>+</sup> and Other Polyhedral Carbon Ions, Astron. Astrophys., 203, 1988, pp. 145-148

Leger et al., Identification of the "Unidentified IR Emission Features of Interstellar Dust?", Astron. Astrophys., 137, 1986, pp. L5-L8

- Lineman et al., High Mass Carbon Clusters from Aromatic Hydrocarbons Observed by Laser Mass Spectrometry, J. Phys. Chem., 93, 1989, pp. 5025-5026
- Liu et al., Negative Carbon Cluster Ion Beams: New Evidence for the Special Nature of  $C_{60}$ , Chemical Physics Letters, 126(2), 1986, pp. 215-217
- Loffler et al., Polyhedral Carbon Ions in Hydrocarbon Flames, Chemical Physics Letters, 137(4), 1987, pp. 306-310
- Luthi et al., Ab Initio Studies on the Thermodynamic Stability of the Icosahedral  $C_{60}$  Molecule "Buckminsterfullerene", Chemical Physics Letters, 135(4)(5), 1987, pp. 357-360
- Marynick et al., Localized Molecular Orbitals and Electronic Structure of Buckminsterfullerene, Chemical Physics Letters, 132(4)(5), pp. 383-386
- Matsumoto, Chemical vapour deposition of diamond in RF glow discharge, Journal of Materials Science Letters, 4, 1985, pp. 600-602
- Matsumoto et al., Synthesis of diamond films in a rf induction thermal plasma, Appl. Phys. Lett., 51(10), 1987, pp. 737-739
- Matsumoto et al., Growth of diamond particles from methane-hydrogen gas, Journal of Materials Science, 17, 1982, pp. 3106-3112
- McElvany et al., FIMS Studies of Mass-Selected, Large Cluster Ions Produced by Direct Laser Vaporization, Chemical Physics Letters, 134(3), 1987, pp. 214-219
- McElvany et al., Ion-Molecule Reaction Studies of Mass Selected Carbon Cluster Ions Formed by Laser Vaporization, J. Chem. Phys., 85(1), 1986, pp. 632-633
- McKee et al., Calculated Properties of  $C_{60}$  Isomers and Fragments, Journal of Molecular Structure (Theochem.), 153, 1987, pp. 75-84
- Miller, Buckminsterfullerene-A Molecular Material for the Future?, Adv. Mater. 3, 5, 1991, pp. 262-265
- Negri et al., Quantum-Chemical Investigation of Franck-Condon and Jahn-Teller Activity in the Electronic Spectra of Buckminsterfullerene, Chemical Physics Letters, 144(1), 1988, pp. 31-36
- Newton et al., Stability of Buckminsterfullerene and Related Carbon Clusters, J. Am. Chem. Soc., 108, 1986, pp. 2469-2470
- O'Brien et al., A Reply to "Magic Numbers in  $C_n^+$  and  $C_n^-$  Abundance Distributions Based on Experimental Observations", Chemical Physics Letters, 132(1), 1986, pp. 99-102

O'Brien et al., Photophysics of buckminsterfullerene and other carbon cluster ions, J. Chem. Phys., 88(1), 1988, pp. 220-230

O'Keefe et al., Production of Large Carbon Cluster Ions by Laser Vaporization, Chemical Physics Letters, 130(1)(2), 1986, pp. 17-19

Ozake et al., On Electronic States and Bond Lengths of the Truncated Icosahedral  $C_{60}$  Molecule, Chemical Physics Letters, 127(3), 1986, pp. 242-244

Paquette, Dodecahedranes and Allied Spherical Molecules, Chem. Rev., 1989, pp. 1051-1065

Parent et al., Investigations of Small Carbon Cluster Ion Structures by Reactions with HON, J. Am. Chem. Soc., 111, 1989, pp. 2393-2401

Pussoletti et al., Experiments on Cosmic Dust Analogues, Proceedings, 149, pp. 25-42

Rabilizirov, The Role of Cavities and Mantles in the Ultraviolet Extinction Peak of Graphite Spheres with Particular Reference to a Possibly Discovered  $C_{60}$  Structure, Astrophysics and Space Science, 125, 1986, pp. 331-339

Radi et al., A New Method for Studying Carbon Clusters in the Gas Phase: Observation of Size Specific Neutral Fragment Loss from Metastable Reactions of Mass Selected  $C_n^+$ ,  $n < 60$ , J. Chem. Phys., 88(4), 1988, pp. 2809-2814

Randic et al., On the Aromatic Stability of a Conjugated  $C_{60}$  Cluster, Croatia Chemical ACTA, 60(4), 1987, pp. 595-604

Rohlfing, High Resolution Time-of-Flight Mass Spectrometry of Carbon and Carbonaceous Clusters, J. Chem. Phys., 93(11), 1990, pp. 7851-7862

Rohlfing, Optical Emission Studies of Atomic, Molecular and Particulate Carbon Produced from a Laser Vaporization Cluster Source, J. Chem. Phys., 89(1), 1988, pp. 6103-6112

Rohlfing et al., Two-Color Pyrametric Imaging of Laser-Heated Carbon Particles in a Supersonic Flow, Chemical Physics Letters, 170(1), 1990, pp. 44-50

Rohlfing et al., Production and characterization of supersonic carbon cluster beams, J. Chem. Phys., 81(7), 1994, pp. 3322-3330

Rosen et al., Electronic Structure of Spheroidal Metal Containing Carbon Shells: Study of the  $LaC_{60}$  and  $C_{60}$  Clusters and Their Ions Within the Local Density Approximation, Z. Phys. D-Atoms, Molecules and Clusters, 1989, pp. 387-390

Rosen et al., Optical Spectrum of the Icosahedral C<sub>60</sub> - "FULLERENE-60": A Challenge for Laser Spectroscopy, Laser Spectroscopy VIII, Proceedings of the Eighth International Conference, 1987, pp. 250-253

Rosen et al., Calculations of the Ionization Thresholds and Electron Affinities of the Neutral, Positively and Negatively Charged C<sub>60</sub> - "FULLERENE-60", J. Chem. Phys., 90(4), 1989, pp. 2525-2526

Rosen et al., First-Principle Calculations of the Ionization Potentials and Electron Affinities of the Spheroidal Molecules C<sub>60</sub> and LaC<sub>60</sub>, J. Am. Chem. Soc., 110, 1988, pp. 8701-8703

Rudzinski et al., Computational Study of Relative Stabilities of C<sub>60</sub>(I<sub>h</sub>) and C<sub>70</sub>(D<sub>5h</sub>) Gas-Phase Clusters, Thermochimica Acta, 125, 1988, pp. 155-162

Rudzinski et al., C<sub>60</sub>(g) and C<sub>70</sub>(g): A COMPUTATIONAL STUDY OF THE PRESSURE AND TEMPERATURE DEPENDENCE OF THEIR POPULATIONS, Carbon 25(6), 1987, pp. 747-750

Satpahty, Electronic Structure of the Truncated-Icosahedral C<sub>60</sub> Cluster, Chemical Physics Letters, 130(6), 1986, pp. 545-550

Schmalz et al., C<sub>60</sub> Carbon Cages, Chemical Physics Letters, 130(3), 1986, pp. 203-207

Schmalz et al., Elemental Carbon Cages, J. Am. Chem. Soc., 110, 1988, 1113-1127

Schulman et al., Symmetrical Clusters of Carbon Atoms: The C<sub>24</sub> and C<sub>60</sub> Molecules, Chemical Physics Letters, 141(1)(2), 1987, pp. 45-48

Scott et al., Benzene Ring Contractions at High Temperatures, Evidence from the Thermal Interconversions of Aceanthrylene, Acephenanthrylene, and Fluoranthene, J. Am. Chem. Soc., 109, 1987, pp. 5461-5465

Shibuya et al., Two Icosahedral Structures for the C<sub>60</sub> Cluster, Chemical Physics Letters, 137(1), 1987, pp. 13-16

Slanina et al., C<sub>60</sub>(g), C<sub>70</sub>(g), Saturated Carbon Vapour and Increase of Cluster Populations with Temperature: A Combined Aml Quantum-Chemical and Statistical-Mechanical Study, Collection Czechoslovak Chem. Commun., 52, 1987, pp. 2831-2839

Slanina et al., On Relative Stability Reasoning for Clusters of Different Dimensions: An Illustration with the C<sub>60</sub>-C<sub>70</sub> System, Thermochimica Acta, 140, 1989, pp. 87-95

Slanina et al., Quantum-Chemically Supported Vibrational Analysis of Giant Molecules: The C<sub>60</sub> and C<sub>70</sub>

Clusters, Journal of Molecular Structure (Theochem), 202, 1989, pp. 169-176

Smalley, Down-to-Earth Studies of Carbon Clusters, Carbon in the Galaxy: Studies from Earth and Space, NASA Conference Publication 3061m, 1990, pp. 199-244

Smalley, Supersonic Carbon Cluster Beams, In Atomic and Molecular Clusters, E.R. Bernstein Editor of Elsevier, Science, 1990, pp. 1-68

Snow et al., A Search for Interstellar and Circumstellar  $C_{60}$ , Astron. Astrophys., 213, 1989, pp. 291-294

So et al., First Observation of Carbon Aggregate Ions  $C_{60}^+$  by Laser Desorption Fourier Transform Mass Spectrometry, J. Phys. Chem., 93, 1989, pp. 1184-1187

Somerville et al., An Astronomical Search for the Molecule  $C_{60}$ , Mon. Nat. R. Ast. Soc., 240, 1989, Short Communication, pp. 41p-46p

Spitsyn, B.V., et al., Vapor Growth of Diamond on Diamond and Other Surfaces, Journal of Crystal Growth, 52, 1981, pp. 219-226

Stankevich et al., The Structural Chemistry of Crystalline Carbon: Geometry, Stability, and Electronic Spectrum, Russian Chemical Reviews, 53(7), 1984, pp. 640-655

Stanton et al., Normal Vibrational Modes of Buckminsterfullerene, J. Phys. Chem., 92, 1988, pp. 2141-2145

Stone et al., Theoretical Studies of Icosahedral  $C_{60}$  and Some Related Species, Chemical Physics Letters, 128(5)(6), 1986, pp. 501-503

Taylor et al., Isolation, Separation and Characterization of the Fullerenes  $C_{60}$  and  $C_{70}$ : The Third Form of Carbon, J. Chem. Soc., Chem. Commun., 1990

Vinokur et al., Measured Extinction Efficiency of Graphite Smoke in the Region 1200-6000A, Nature Physical Science, 243, 1973, pp. 50-51

Wales, Closed-Shell Structures and the Building Game, Chemical Physics Letters, 141(6), 1987, pp. 478-494

Weeks et al., Rotation-Vibration Spectra of Icosahedral Molecules. II. Icosahedral Symmetry, Vibrational Eigenfrequencies, and Normal Modes of Buckminsterfullerene, J. Chem. Phys., 90(9), 1989, pp. 4744-4771

Weiss et al., Photophysics of Metal Complexes of Spheroidal Carbon Shells, J. Am. Chem. Soc., 110, 1988, pp. 4464-4465

Weltner, Jr., et al., Carbon Molecules, Ions and Clusters, Chem. Rev., 89, 1989, pp. 1713-1747

Wilcox, Jr., Extraction with Solvents, Experimental Organic Chemistry, pp. 79-80

Williams, Close Packing of Spheres, J. Chem. Phys. 87(7), 1987, pp. 4206-4211

Wu et al., Vibrational Motions of Buckminsterfullerene, Chemical Physical Letters, 137(3), 1987, pp. 291-294

Yang et al., Ups of buckminsterfullerene and other Large clusters of Carbon, Chemical Physics Letters, 139(3)(4), 1987, pp. 233-238

Yang et al., Ups of a 2-30-Atom Carbon Clusters: Chains and Rings, Chemical Physics Letters, 144(5)(6), pp. 431-436

Zhang et al., Reactivity of Large Carbon Clusters: Spheroidal Carbon Shells Their Possible Relevance to the Formation and Morphology of Soot, The Journal of Physical Chemistry, 90(4), 1986, pp. 525-528.

The present application is a continuation of USSN 07/580,246, filed August 10, 1990 which is a CIP of USSN 07/575,254, filed on August 30, 1990. Applicants are relying upon each of the above-identified applications for an earlier filing date under 35 U.S.C. §120.

Much of the art listed hereinabove and in the accompanying PTO-1449 form was made of record in at least one of the above applications, particularly USSN 07/580,246. Inasmuch as a copy of much of the art listed hereinabove and in the accompanying PTO 1449 form has already been submitted in one of the above-identified applications, in accordance with 37 C.F.R. §1.98(d), applicants are not forwarding a copy of these references. Accordingly, applicants are enclosing a copy of only that which is newly cited.

Most of the art listed therein is in the English language. However, a few are not in English. In accordance with 37 C.F.R. §1.98(a)(3) a concise explanation of the

relevance, as it is presently understood, is summarized hereinbelow.

Keller, in GIT Fachz Lab., 1987, 31, 618-623 discloses that the irradiation by intense laser light of their graphite foils causes the vaporization of carbon fragments which can be identified by mass spectroscopy. According to the author, the mass spectrum indicates that C60 possesses special stability. The article confirms the stability of the C60 since there was practically no reaction of C60 with, inter alia, gaseous NO, SO<sub>2</sub> and NH<sub>3</sub>.

Anales Astrophysic, "Etude De Poussieres De Fer et De Carbone," J. Lefevre, Tome 30, Annee, 1967, Fasc 4, pp. 731-738, discloses that carbon and ion grains have been produced in argon arc discharge. The article discloses that the grains are associated in chain-like structures.

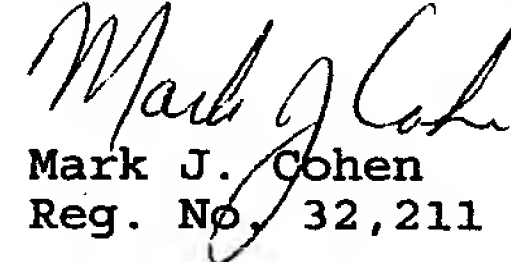
The other two references not in the English language, JO 2221-194A and JO 2160-696, had abstracts in the English language attached thereto. These abstracts attached thereto are incorporated herein by reference.

In addition, the Russian Patent 1,587,000 and West German Patent 2,414,215 are also not in the English language, but these were cited by the U.S. Patent and Trademark Office in U.S.S.N. 08/236,933. Thus, a translation thereof and/or abstract thereof was provided in this application, and the contents thereof are incorporated by reference.

Consideration of the Information Disclosure Statement is respectfully requested since the art provided may be material to the examination of the present application, as defined in 37 C.F.R. §1.56(a).

Inasmuch as this Information Disclosure Statement is being submitted after the issuance of a first Office Action on the merits, but prior to the issuance of a final Official Action or a Notice of Allowance, in accordance with the provisions of 37 C.F.R. §1.97(c), authorization is given to charge applicants' account the fee set forth in 37 C.F.R. §1.17(p).

Respectfully submitted,

  
Mark J. Cohen  
Reg. No. 32,211

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Form PTO-1449 (REV. 7-80)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		Atty. Docket No. 79132Y		Serial No. 08/471,890	
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<b>PATENT DOCUMENTS</b>							
EXAMINER INITIAL*		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE (if appropriate)
	AA	2,635,994	4/27/50	Tierman			
	AB	2,957,756	10/60	Bacon			
	AC	3,009,783	12/4/59	Sheer, et al.			
	AD	3,172,774	2/28/61	Diefendorf			
	AE	3,317,354	5/2/67	Darrow, et al.			
	AF	4,132,671	2/2/79	Deininger, et al.			
	AG	4,167,444	9/11/79	Schweiger			
	AH	4,435,375	3/6/84	Tamura, et al.			
	AI	4,435,378	3/6/84	Reck, et al.			
	AJ	4,767,608	8/30/88	Matsumoto, et al.			
<b>FOREIGN PATENT DOCUMENTS</b>							
		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION
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	AK	GB 2 101 983 A	2/23/83	United Kingdom			
	AL	2 160 696	6/20/90	Japan			
	AM	2 221 194	2/21/89	Japan			
	AN	1,587,000	8/23/90	Russia			
	AO	2,414,215	1/8/76	Germany			
<b>OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)</b>							
	AP	Aihara et al., Spherical Aromaticity of Buckminsterfullerene, <u>Bull. Chem. Soc. Jpn.</u> , 61, 1988, pp. 2657-2659					
	AR	Akhter, et al., The Structure of Hexane Soot II: Extraction Studies, <u>Applied Spectroscopy</u> , 39(1), 1985, pp. 154-167					
	AS	Almlof et al., Theoretical Methods and Results for Electronic Structure Calculations on Very Large Systems Carbon Clusters, <u>ACS Symposium Series</u> , 353, 1987, pp. 35-48					
	AT	Amato, A First Sighting of Buckyballs in the Wild, <u>Science</u> , 257(5067), 1992, p. 167					
	AU	Amic et al., On the Lack of Reactivity of Buckminsterfullerene: A Theoretical Study, <u>J. Chem. Soc. Perkin Trans.</u> , 1990, pp. 1595-1598					
	AV	Bacon, R., <u>J. Applied Physics</u> , 31(2), 1960, pp. 283-290					
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AA	4,915,977	4/10/90	Okamoto, et al.				
AB	4,922,827	5/8/90	Remo				
AC	5,114,477	5/19/92	Mort, et al.				
AD	5,132,105	7/21/92	Remo				
AE	5,234,474	6/19/91	Whewell				
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AP	Balasubramanian et al., Computer Generation of Spectra of Graphs: Applications to C <sub>60</sub> Clusters and Other Systems, <u>Journal of Computational Chemistry</u> , 9(4), 1988, pp. 406-415						
AR	Ballester et al., Atoms in Carbon Cages as a Source of Interstellar Diffuse Lines, <u>The Astrophysical Journal</u> , 356, 1990, pp. 507-512						
AS	Blau et al., An Investigation of the Microfrictional Behavior of C <sub>60</sub> Particle Layers on Aluminum, <u>Thin Solid Films</u> , 219, 1993, pp. 129-134						
AT	Bloomfield et al., Negative and Positive Cluster Ions of Carbon and Silicon, <u>Chemical Physics Letters</u> , 121(1) (2), 1985, pp. 33-37						
AU	Bochvar et al., Problems in the Structural Chemistry of Crystalline Carbon, <u>Sov. Sci. Rev. B. Chem.</u> , 9, 1987, pp. 483-527						
AV	Brendsdal et al., Normal Coordinate Analysis of "Footballene" C <sub>60</sub> , <u>Specroscopy Letters</u> , 21(4), 1988, pp. 313-318						
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	AP	Brendsdal, Symmetry Coordinates of Molecular Vibrations of "Footballene" C <sub>60</sub> , <u>Spectroscopy Letters</u> , 21(4), 1988, pp. 319-339					
	AR	Brendsdal et al., Kekule Structures of Footballene, <u>Journal of Molecular Structure (Theochem)</u> , 1989, pp. 55-66					
	AS	Brown, High Symmetries in Quantum Chemistry, <u>Chemical Physics Letters</u> , 136(2), 1987, pp. 128-133					
	AT	Buseck et al., Fullerenes from the Geological Environment, <u>Science</u> , 257(5067), 1992, pp. 215-217					
	AU	Bussoletti, Dusty Objects in the Universe, pp. 89-93					
	AV	Campbell et al., An Intense, Simple Carbon Cluster Source, <u>J. Chem. Phys.</u> , 93(9), 1990, pp. 6900-6907					
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OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)		
	AP	Caulemans et al., SO(4) Symmetry and the Static Jahn-Teller Effect in Icosahedral Molecules, <u>Physical Review A</u> , 39(2), 1989, pp. 481-493
	AR	Ceulemans et al., The Jahn-Teller Instability of Fivefold Degenerate States in Icosahedral Molecules, <u>J. Chem. Phys.</u> , 93(2), 1990, pp. 1221-1234
	AS	Coulantbeau et al., Calculs de Proprietes Electroniques et des Frequences Normales de Vibration D'Agregats Carbones Formant Des Polyedres Reguliers et Semi-Reguliers, <u>Journal de chimie physique</u> , 84, 1987, pp. 7-8
	AT	Cox et al., C <sub>60</sub> La: A Deflated Soccer Ball?, <u>J. Am. Chem. Soc.</u> , 108, 1986, pp. 2457-2458
	AU	Cox et al., Carbon Clusters Revisited: The "Special" Behavior of C <sub>60</sub> and Large Carbon Clusters, <u>J. Chem. Phys.</u> , 88(3), 1988, pp. 1588-6907
	AV	Creasy, Some Model Calculations of Carbon Cluster Growth Kinetics, <u>J. Chem. Phys.</u> , 92(12), 1990, pp. 7223-7233

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OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)		
AP	Creasy et al., Large Carbon Cluster Ion Formation by Laser Ablation of Polyamide and Graphite, <u>Chemical Physics</u> , 126, 1988, pp. 453-468	
AR	Creasy et al., Formation of High Mass Carbon Cluster Ions from Laser Ablation of Polymers and Thin Carbon Films, <u>J. Chem. Phys.</u> , 92(4), 1990, pp. 2269-2277	
AS	Curl et al., Probing C <sub>60</sub> , <u>Science</u> , 242, 1988, pp. 1017-1022	
AT	Curl et al., Fullerenes, <u>Scientific America</u> , 1991, pp. 54-64	
AU	Cyvin et al., Molecular Vibrations of Footballene, <u>Chemical Physics Letters</u> , 143(4), 1988, pp. 377-380	
AV	Daniel, Jr., Studies Toward a Convergent Synthesis of C <sub>60</sub> , <u>Dissertation Abstracts International</u> , 49(5), 1988, p. 1706-B	

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AP	Dias, A Facile Huckel Molecular Orbital Solution of Buckminsterfullene Using Chemical Graph Theory, <u>Journal of Chemical Education</u> , 66(12), 1989, pp. 1012-1015	
AR	Dietz et al., Laser Production of Supersonic Metal Cluster Beams, <u>J. Chem. Phys.</u> , 74(1), 1981, pp. 6511-6512	
AS	Disch et al., On Symmetrical Clusters of Carbon Atoms: C <sub>60</sub> , <u>Chemical Physics Letters</u> , 125(5)(6), 1986, pp. 465-466	
AT	Ebbesen, et al., Origins of Fullerenes in Rocks, <u>Science</u> , 268, 1995, pp. 1634-1635	
AU	Elser et al., Magnetic Behavior of Icosahedral C <sub>60</sub> , <u>Physical Review of General Physics Third Series</u> , 36(10), 1987, pp. 4579-4585	
AV	Elser et al., Icosahedral C <sub>60</sub> : An Aromatic Molecule with a Vanishingly Small Ring Current Magnetic Susceptibility, <u>Nature</u> , 325, 1987, pp. 792-794	

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	AP	Feld et al., Carbon Cluster Emission from Polymers Under Kilolectronvolt and Magaelectronvolt Ion Bombardment, <u>J. Phys. Chem.</u> , 94, 1990, pp. 4595-4599					
	AR	Feng et al., Quantum-Chemical Investigation of Buckminsterfullerene and Related Carbon Clusters (I):The Electronic Structure and UV Spectra of Buckminsterfullerene and Other C <sub>60</sub> Cages, <u>International Journal of Quantum Chemistry</u> , XXXVII, 1990, pp. 509-607					
	AS	Fowler et al., $\pi$ -Systems in Three Dimensions, <u>Chemical Physics Letters</u> , 127(1), 1986, pp. 78-83					
	AT	Fowler, Carbon Cylinders:A Class of Closed-shell Clusters, <u>J. Chem. Soc. Faraday Trans.</u> , 86(2), 1990, pp. 2073-2077					
	AU	Fowler, How Unusual is C <sub>60</sub> ? Magic Numbers for Carbon Clusters, <u>Chemical Physics Letters</u> , 131(6), 1986, pp. 444-450					
	AV	Fowler et al., Systematics of Bonding in Non-Icosahedral Carbon Clusters, <u>Theor. Chim. Acta</u> , 73, 1988, pp. 1-26					
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AP	Fowler et al., Electric and Magnetic Properties of the Aromatic Sixty-Carbon Cage, <u>Chemical Physical Letters</u> , 165(1), 1990, pp. 79-86
AR	Fowler et al., The Leapfrog Principle: A Rule for Electron Counts of Carbon Clusters, <u>J. Chem. Soc., Chem. Commun.</u> , 1987, pp. 1403-1405
AS	Gerhardt et al., Polyhedral Carbon Ions in Hydrocarbon Flames, <u>Chemical Physical Letters</u> , 137(4), 1987, pp. 306-310
AT	Gerhardt et al., The Formation of Polyhedral Carbon Ions in Fuel-Rich Acetylene and Benzene Flames, Twenty-Second Symposium (International) on Combustion/The Combustion Institute, 1988, pp. 395-401
AU	Gerhardt et al., Large Ionic Species in Sooting Acetylene and Benzene Flames, AGARD Proc. No. 422, Combustion and Fuels in Gas Turbine Origins, 1988, p. 22-1-22-11
AV	Gerhardt et al., Polyhedral Carbon Ions in Hydrocarbon Flames, <u>Chemical Physics Letters</u> , 137(4), 1987, pp. 306-310

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	AR	Geusic et al., Photodissociation of Carbon Cluster Cations, <u>J. Chem. Phys.</u> , 86(7), 1987, pp. 3862-3869					
	AS	Haddon, Measure of Nonplanarity in Conjugated Organic Molecules: Which Structurally Characterized Molecule Displays the Highest Degree of Pyramidalization?, <u>J. Am. Chem. Soc.</u> , 112, 1990, pp. 3385-3389					
	AT	Haddon et al., Electronic Structure and Bonding in Icosahedral C <sub>60</sub> , <u>Chemical Physics Letters</u> , 125(5)(6), 1986, pp. 459-464					
	AU	Haddon et al., Icosahedral C <sub>60</sub> Revisited: An Aromatic Molecule with a Vanishingly Small Ring Current Magnetic Susceptibility, <u>Chemical Physics Letters</u> , 169(4), 1990, pp. 362-364					
	AV	Haddon et al., Rehybridization and $\pi$ -Orbital Alignment: The Key to the Existence of Spheroidal Carbon Clusters, <u>Chemical Physics Letters</u> , 131(3), pp. 165-169					
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	AP	Hahn et al., Magic Numbers in $C_{+N}$ and $C_N$ Abundance Distributions, <u>Chemical Physics Letters</u> , 130(1)(1), 1986, pp. 12-16					
	AR	Hale, Discrete-Variational-X Alpha Electronic Structure Studies of the Spherical $C_{60}$ Cluster: Prediction of Ionization Potential and Electronic Transition Energy, <u>J. Am. Chem. Soc.</u> , 108, 1986, pp. 6087-6088					
	AS	Harano et al., Decomposition of Gaseous Hydrocarbons in a Laser-induced Plasma as a Novel Carbonaceous Source for Cluster Formation, <u>Chemical Physics Letters</u> , 172(3)(4), 1990, pp. 219-223					
	AT	Hargittai et al., Quasicrystals, Networks and Molecules of Fivefold Symmetry, pp. 239-287					
	AU	Harter et al., Rovibrational Spectral Fine Structure of Icosahedral Molecules, <u>Chemical Physics Letters</u> , 132(4)(5), 1986, pp. 387-392					
	AV	Harter et al., Rotation-Vibration Spectra of Icosahedral Molecules. I. Icosahedral Symmetry Analysis and Fine Structure, <u>J. Chem. Phys.</u> 90(9), 1089, pp. 4727-4743					
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OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)		
	AP	Hayden et al., $\pi$ Bonding in the Icosahedral C <sub>60</sub> Cluster, <u>Physical Review B</u> , 36(9), 1987, pp. 5010-5015
	AR	Haymet, C <sub>120</sub> and C <sub>60</sub> : Archimedean Solids Constructed from sp <sup>2</sup> Hybridized Carbon Atoms, <u>Chemical Physics Letters</u> , 122(5), 1985, pp. 421-424
	AS	Haymet, Footballene: A Theoretical Prediction for the Stable, Truncated Icosahedral Molecule C <sub>60</sub> , <u>J. Am. Chem. Soc.</u> , 108, 1986, pp. 319-321
	AT	Heath, The Formation of Long Carbon Chain Molecules during Laser Vaporization of Graphite, <u>J. Am. Chem. Soc.</u> , 109, 1987, pp. 359-363
	AU	Heath et al., Long Carbon Chain Molecules in Circumstellar Shells, <u>The Astrophysical Journal</u> , 314, 1987, pp. 352-355
	AV	Heath et al., Lanthanum Complexes of Spheroidal Carbon Shells, <u>J. Am. Chem. Soc.</u> , 107, 1985, pp. 7779-7780

EXAMINER	DATE CONSIDERED
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OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)							
	AP	Heath et al., The UV Absorption Spectrum of C <sub>60</sub> (buckminsterfullerene): A Narrow Band at 3860 Å, <u>J. Chem. Phys.</u> , 87(7), 1987, pp. 4236-4238					
	AR	Hecht, ...and shower the Earth with buckyballs, <u>Science</u> , 1994, pp. 16					
	AS	Hess, Jr. et al., The Stability of Footballene, <u>J. Org. Chem.</u> , 1986, pp. 3902-3903					
	AT	Heymann, et al., Fullerenes in the Cretaceous-Tertiary Boundary Layer, <u>Science</u> , 265, 1994, pp. 645-647 Heymann, Buckminsterfullerene, its Siblings, and Soot, Carriers of Trapped Inert Gases in Meteorites?, <u>Proceedings of the Seventeenth Lunar and Planetary Science Conference, Part 1, Journal of Geophysical Research</u> , 91(B13), 1986, pp. E135-E138					
	AU	Huffman, Methods and Difficulties in Laboratory Studies of Cosmic Dust Analogues, in <u>Experiments on Cosmic Dust Analogues</u> , Edited by Bussoletti et al., 1988, pp. 25-42					
	AV	Hollow Molecules, <u>New Scientist</u> , 1966, pp. 118-119					
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<b>OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)</b>							
	AP	Howard et al., Fullerenes C <sub>60</sub> and C <sub>70</sub> in Flames, <u>Letters to Nature</u> , 352, 1992, pp. 139-141					
	AR	Huffman, D., et al., <u>Nature (Phys. Sci)</u> , 243, 1973, pp. 50-51					
	AS	Huffman, D., "Methods and Difficulties in Laboratory Studies of Cosmic Dust Analogues", in book "Experiments on Cosmic Dust Analogues", Bussoletti, E., Editor, Kluwer Academic Publishers, Boston MA, 1988, pp. 25-42					
	AT	Iijima, The 60-Carbon Cluster Has Been Revealed?, <u>J. Phys. Chem.</u> , 91, 1987, pp. 3466-3467					
	AU	Jelski et al., Clusters: Link Between Molecules and Solids, <u>Journal of Chemical Education</u> , 65(10), 1988, pp. 879-883					
	AV	Jiang et al., Stability and Reactivities Based on Moment Analysis, <u>Theor. Chim. Acta</u> , 75, 1989, pp. 279-297					
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<b>OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)</b>							
	AP	Joblin et al., Detection of Diffuse Interstellar Bands in the Infrared, <u>Nature</u> , 346, 1990, pp. 729-731					
	AR	Kaldor et al., Molecular Surfaces: Chemistry and Physics of Gas Phase Clusters, Microclusters: Proceedings of the First NEC Symposium, 1987, pp. 96-106					
	AS	Kaldor et al., The Basics of Molecular Surfaces, <u>Chemtech</u> , 1987, pp. 300-307					
	AT	Kamo, Mutsukazu et al., Diamond Synthesis from Gas Phase in Microwave Plasma, <u>Journal of Crystal Growth</u> , 62, 1983, pp. 642-644					
	AU	Kappler, P., "Fine Carbon Particle Formation by Carbon Vapor Condensation", <u>J. Applied Phys.</u> , 50(1), 1979, pp. 308-316					
	AV	Kataoka et al., Geometrical Structures and Spectra of Corannulene and Icosahedral C <sub>60</sub> Tetrahedron, 42(23), pp. 6437-6442					
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OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)							
	AP	Keller, Der C60 Cluster Footballen oder Buckminsterfullerene, <u>GIT. Fachz. Lab</u> , 31, 1987, pp. 619-623					
	AR	Kirk-Othmer, Encyclopedia of Chemical Technology, Third Edition, Volume 4, Blood, Coagulants and Anticoagulants to Cardiovascular Agents, pp. 652-653					
	AS	Klein et al., Icosahedral Symmetry Carbon Cage Molecules, <u>Nature</u> , 323, 1986, pp. 703-706					
	AT	Klein et al., Resonance in C <sub>60</sub> Buckminsterfullerene, <u>J. Am. Chem. Soc.</u> , 108, 1986, pp. 1301-1302					
	AU	Kovacevic, et al., On the Hybridization in Some Archimedean Carbon Clusters, <u>International Journal of Quantum Chemistry Symposium 21</u> , 1987, pp. 589-593					
	AV	Kratschmer, W., et al., "Search for the UV and IR Spectra of C <sub>10</sub> ..." in "Dusty Objects in the Universe: Proceedings of the 4th Int. Workshop of the Astron. Observatory held at Capri, Italy, 1989					
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	AP	Kratschmer et al., The Infrared and Ultraviolet Absorption Spectra of Laboratory-Produced Carbon Dust: Evidence for the Presence of the C <sub>60</sub> Molecule, <u>Chemical Physics Letters</u> , 170(2)(3), 1990					
	AR	Kratschmer, W., et al., <u>Chem. Phys. Lett.</u> , 170(2)(3), 1990, pp. 167-170					
	AS	Kratschmer, W., et al., <u>Surface Science</u> , 156, 1985, pp. 814-821					
	AT	Kratschmer and No. Sorg, Spectroscopy of Matrix-Isolated Carbon Cluster Molecules Between 200 and 850 nm Wavelength, <u>Surface-Science</u> , 156, 1985, pp. 814-821					
	AU	Kratschmer et al., Search for the UV and IR Spectra of C <sub>60</sub> in Laboratory-Produced Carbon Dust, <u>Dusty Objects in the Universe</u> , 1990, pp. 89-93					
	AV	Kroto, The Formation and Structure of Circumstellar and Interstellar Dust, Carbon in the Galaxy: Studies from Earth and Space, <u>NASA Conference Publication 3061</u> , pp. 275-284					
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OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)							
	AP	Kroto et al., The Formation of Quasi-Icosahedral Spiral Shell Carbon Particles, <u>Nature</u> , 331, 1988, pp. 328-331					
	AR	Kroto et al., C <sub>60</sub> :Buckminsterfullerene, <u>Nature</u> , 318, 1985, pp. 162-163					
	AS	Kroto, Giant Fullerenes, <u>Chemistry in Britain</u> , 1980, pp. 40-45					
	AT	Kroto, The Chemistry of the Interstellar Medium, <u>Phil. Trans. R. Soc. Land. A</u> , 325, 1988, pp. 405-421					
	AU	Kroto et al., C <sub>60</sub> : Buckminsterfullerene, <u>Nature</u> , 318, 1985, pp. 162-163					
	AV	Kroto, C <sub>60</sub> Fullerenes, Giant Fullerenes and Soot, <u>Pure &amp; Appl. Chem.</u> , 62(3), 1990, pp. 407-415					
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	AP	Kroto, Giant Fullerenes, <u>Chemistry in Britain</u> , 1990, pp. 40-43					
	AR	Kroto, The Role of Linear and Spheroidal Carbon Molecules in Interstellar Grain Formation, <u>Ann. Phys. Fr.</u> , 14, 1989, pp. 169-179					
	AS	Kroto, The Stability of the Fullerenes C <sub>n</sub> , with n=24, 28, 32, 36, 50, 60 and 70, <u>Nature</u> , 329, 1987, pp. 529-531					
	AT	Kroto, Space, Stars, C60 and Soot, <u>Science</u> , 242, 1988, pp. 1139-1145					
	AU	Kroto, Chains and Grains in Interstellar Space, Polycyclic Aromatic Hydrocarbons and Astrophysics, pp. 197-206					
	AV	Kurihara, et al., High rate synthesis of diamond by dc plasma jet chemical vapor deposition, <u>Appl. Phys. Lett.</u> , 52(6), 1988, pp. 437-438					
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OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)							
	AP	Larsson et al., OPTICAL SPECTRUM OF THE ICOSAHEDRAL C <sub>60</sub> - "FULLERENE-60", <u>Chemical Physical Letters</u> , 137(6), 1987, pp. 501-503					
	AR	Laszlo et al., A Study of the UV Spectrum of the Truncated Icosahedral C <sub>60</sub> Molecule, <u>Journal of Molecular Structure (Theochem)</u> , 183, 1989, pp. 271-278					
	AS	Laszlo et al., On the Geometrical Structure and UV Spectrum of the Truncated Icosahedral C <sub>60</sub> Molecule, <u>Chemical Physics Letters</u> , 136(5), 1987, pp. 418-422					
	AT	Lefevre, J., Etude de Poussieres de Fer et de Carbone, Tome 30, Annee 1967, Fasc. 4, pp. 731-738					
	AU	Lefevre, An Experimental Study of the Dust of Iron, Carbon, Silicon Carbide and Silica, <u>Astron. &amp; Astrophys.</u> , 5(1), 1970, pp. 37-44					
	AV	Lefevre, J., <u>Astron. Astrophys.</u> , 5, 1970, p. 37 and pp. 39-44					
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OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)		
	AP	Leger et al., Remarkable Candidates for the Carrier of the Diffuse Interstellar Bands: C <sub>60</sub> <sup>+</sup> and Other Polyhedral Carbon Ions, <u>Astron. Astrophys.</u> , 203, 1988, pp. 145-148
	AR	Leger et al., Identification of the "Unidentified IR Emission Features of Interstellar Dust?", <u>Astron. Astrophys.</u> , 137, 1986, pp. L5-L8
	AS	Lineman et al., High Mass Carbon Clusters from Aromatic Hydrocarbons Observed by Laser Mass Spectrometry, <u>J. Phys. Chem.</u> , 93, 1989, pp. 5025-5026
	AT	Liu et al., Negative Carbon Cluster Ion Beams: New Evidence for the Special Nature of C <sub>60</sub> , <u>Chemical Physics Letters</u> , 126(2), 1986, pp. 215-217
	AU	Loffler et al., Polyhedral Carbon Ions in Hydrocarbon Flames, <u>Chemical Physics Letters</u> , 137(4), 1987, pp. 306-310
	AV	Luthi et al., Ab Initio Studies on the Thermodynamic Stability of the Icosahedral C <sub>60</sub> Molecule "Buckminsterfullerene", <u>Chemical Physics Letters</u> , 135(4)(5), 1987, pp. 357-360

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	AR	Leger et al., Identification of the "Unidentified IR Emission Features of Interstellar Dust?", <u>Astron. Astrophys.</u> , 137, 1986, pp. L5-L8
	AS	Lineman et al., High Mass Carbon Clusters from Aromatic Hydrocarbons Observed by Laser Mass Spectrometry, <u>J. Phys. Chem.</u> , 93, 1989, pp. 5025-5026
	AT	Liu et al., Negative Carbon Cluster Ion Beams: New Evidence for the Special Nature of C <sub>60</sub> , <u>Chemical Physics Letters</u> , 126(2), 1986, pp. 215-217
	AU	Loffler et al., Polyhedral Carbon Ions in Hydrocarbon Flames, <u>Chemical Physics Letters</u> , 137(4), 1987, pp. 306-310
	AV	Luthi et al., Ab Initio Studies on the Thermodynamic Stability of the Icosahedral C <sub>60</sub> Molecule "Buckminsterfullerene", <u>Chemical Physics Letters</u> , 135(4) (5), 1987, pp. 357-360
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OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)							
	AP	Marynick et al., Localized Molecular Orbitals and Electronic Structure of Buckminsterfullerene, <u>Chemical Physics Letters</u> , 132(4)(5), pp. 383-386					
	AR	Matsumoto, Chemical vapour deposition of diamond in RF glow discharge, <u>Journal of Materials Science Letters</u> , 4, 1985, pp. 600-602					
	AS	Matsumoto et al., Synthesis of diamond films in a rf induction thermal plasma, <u>Appl. Phys. Lett.</u> , 51(10), 1987, pp. 737-739					
	AT	Matsumoto et al., Growth of diamond particles from methane-hydrogen gas, <u>Journal of Materials Science</u> , 17, 1982, pp. 3106-3112					
	AU	McElvany et al., FIMS Studies of Mass-Selected, Large Cluster Ions Produced by Direct Laser Vaporization, <u>Chemical Physics Letters</u> , 134(3), 1987, pp. 214-219					
	AV	McElvany et al., Ion-Molecule Reaction Studies of Mass Selected Carbon Cluster Ions Formed by Laser Vaporization, <u>J. Chem. Phys.</u> , 85(1), 1986, pp. 632-633					
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OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)		
	AP	McKee et al., Calculated Properties of C <sub>60</sub> Isomers and Fragments, <u>Journal of Molecular Structure</u> (Theochem.), 153, 1987, pp. 75-84
	AR	Miller, Buckminsterfullerene-A Molecular Material for the Future?, <u>Adv. Mater.</u> 3, 5, 1991, pp. 262-265
	AS	Negri et al., Quantum-Chemical Investigation of Franck-Condon and Jahn-Teller Activity in the Electronic Spectra of Buckminsterfullerene, <u>Chemical Physics Letters</u> , 144(1), 1988, pp. 31-36
	AT	Newton et al., Stability of Buckminsterfullerene and Related Carbon Clusters, <u>J. Am. Chem. Soc.</u> , 108, 1986, pp. 2469-2470
	AU	O'Brien et al., A Reply to "Magic Numbers in Cn+ and Cn- Abundance Distributions Based on Experimental Observations, <u>Chemical Physics Letters</u> , 132(1), 1986, pp. 99-102
	AV	O'Brien et al., Photophysics of buckminster-fullerene and other carbon cluster ions, <u>J. Chem. Phys.</u> , 88(1), 1988, pp. 220-230
EXAMINER _____ DATE CONSIDERED _____		

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<b>OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)</b>							
	AP	O'Keefe et al., Production of Large Carbon Cluster Ions by Laser Vaporization, <u>Chemical Physics Letters</u> , 130(1)(2), 1986, pp. 17-19					
	AR	Ozake et al., On Electronic States and Bond Lengths of the Truncated Icosahedral C <sub>60</sub> Molecule, <u>Chemical Physics Letters</u> , 127(3), 1986, pp. 242-244					
	AS	Paquette, Dodecahedranes and Allied Spherical Molecules, <u>Chem. Rev.</u> , 1989, pp. 1051-1065					
	AT	Parent et al., Investigations of Small Carbon Cluster Ion Structures by Reactions with HON, <u>J. Am. Chem. Soc.</u> , 111, 1989, pp. 2393-2401					
	AU	Pussoletti et al., Experiments on Cosmic Dust Analogues, <u>Proceedings</u> , 149, pp. 25-42					
	AV	Rabilizirov, The Role of Cavities and Mantles in the Ultraviolet Extinction Peak of Graphite Spheres with Particular Reference to a Possibly Discovered C <sub>60</sub> Structure, <u>Astrophysics and Space Science</u> , 125, 1986, pp. 331-339					
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OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)		
	AP	Randic et al., On the Aromatic Stability of a Conjugated C <sub>60</sub> Cluster, <u>Croatia Chemical ACTA</u> , 60(4), 1987, pp. 595-604
	AR	Rohlfing, High Resolution Time-of-Flight Mass Spectrometry of Carbon and Carbonaceous Clusters, <u>J. Chem. Phys.</u> , 93(11), 1990, pp. 7851-7662
	AS	Rohlfing, Optical Emission Studies of Atomic, Molecular and Particulate Carbon Produced from a Laser Vaporization Cluster Source, <u>J. Chem. Phys.</u> , 89(1), 1988, pp. 6103-6112
	AT	Rohlfing et al., Two-Color Pyrametric Imaging of Laser-Heated Carbon Particles in a Supersonic Flow, <u>Chemical Physics Letters</u> , 170(1), 1990, pp. 44-50
	AU	Rohlfing et al., Production and characterization of supersonic carbon cluster beams, <u>J. Chem. Phys.</u> , 81(7), 1994, pp. 3322-3330
	AV	Rosen et al., Electronic Structure of Spheroidal Metal Containing Carbon Shells: Study of the LaC <sub>60</sub> and C <sub>60</sub> Clusters and Their Ions Within the Local Density Approximation, <u>Z. Phys. D-Atoms, Molecules and Clusters</u> , 1989, pp. 387-390

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OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)							
	AP	Rosen et al., Optical Spectrum of the Icosahedral C <sub>60</sub> - "FULLERENE-60": A Challenge for Laser Spectroscopy, Laser Spectroscopy VIII, Proceedings of the Eighth International Conference, 1987, pp. 250-253					
	AR	Rosen et al., Calculations of the Ionization Thresholds and Electron Affinities of the Neutral, Positively and Negatively Charged C <sub>60</sub> - "FULLERENE-60", <u>J. Chem. Phys.</u> , 90(4), 1989, pp. 2525-2526					
	AS	Rosen et al., First-Principle Calculations of the Ionization Potentials and Electron Affinities of the Spheroidal Molecules C <sub>60</sub> and LaC <sub>60</sub> , <u>J. Am. Chem. Soc.</u> , 110, 1988, pp. 8701-8703					
	AT	Rudzinski et al., Computational Study of Relative Stabilities of C <sub>60</sub> (I <sub>h</sub> ) and C <sub>70</sub> (D <sub>5h</sub> ) Gas-Phase Clusters, <u>Thermochimica Acta</u> , 125, 1988, pp. 155-162					
	AU	Rudzinski et al., C <sub>60</sub> (g) and C <sub>70</sub> (g): A COMPUTATIONAL STUDY OF THE PRESSURE AND TEMPERATURE DEPENDENCE OF THEIR POPULATIONS, <u>Carbon</u> 25(6), 1987, pp. 747-750					
	AV	Satpahty, Electronic Structure of the Truncated-Icosahedral C <sub>60</sub> Cluster, <u>Chemical Physics Letters</u> , 130(6), 1986, pp. 545-550					
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OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)							
	AP	Schmalz et al., C <sub>60</sub> Carbon Cages, <u>Chemical Physics Letters</u> , 130(3), 1986, pp. 203-207					
	AR	Schmalz et al., Elemental Carbon Cages, <u>J. Am. Chem. Soc.</u> , 110, 1988, 1113-1127					
	AS	Schulman et al., Symmetrical Clusters of Carbon Atoms: The C <sub>24</sub> and C <sub>60</sub> Molecules, <u>Chemical Physics Letters</u> , 141(1) (2), 1987, pp. 45-48					
	AT	Scott et al., Benzene Ring Contractions at High Temperatures, Evidence from the Thermal Interconversions of Aceanthrylene, Acephenanthrylene, and Fluoranthene, <u>J. Am. Chem. Soc.</u> , 109, 1987, pp. 5461-5465					
	AU	Shibuya et al., Two Icosahedral Structures for the C <sub>60</sub> Cluster, <u>Chemical Physics Letters</u> , 137(1), 1987, pp. 13-16					
	AV	Slanina et al., C <sub>60</sub> (g), C <sub>70</sub> (g), Saturated Carbon Vapour and Increase of Cluster Populations with Temperature: A Combined Aml Quantum-Chemical and Statistical-Mechanical Study, <u>Collection Czechoslovak Chem. Commun.</u> , 52, 1987, pp. 2831-2839					
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OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)							
	AP	Slanina et al., On Relative Stability Reasoning for Clusters of Different Dimensions: An Illustration with the C <sub>60</sub> -C <sub>70</sub> System, <u>Thermochimica Acta</u> , 140, 1989, pp. 87-95					
	AR	Slanina et al., Quantum-Chemically Supported Vibrational Analysis of Giant Molecules: The C <sub>60</sub> and C <sub>70</sub> Clusters, <u>Journal of Molecular Structure (Theochem)</u> , 202, 1989, pp. 169-176					
	AS	Smalley, Down-to-Earth Studies of Carbon Clusters, Carbon in the Galaxy: Studies from Earth and Space, <u>NASA Conference Publication</u> 3061m, 1990, pp. 199-244					
	AT	Smalley, Supersonic Carbon Cluster Beams, In Atomic and Molecular Clusters, E.R. Bernstein Editor of Elsevier, <u>Science</u> , 1990, pp. 1-68					
	AU	Snow et al., A Search for Interstellar and Circumstellar C <sub>60</sub> , <u>Astron. Astrophys.</u> , 213, 1989, pp. 291-294					
	AV	So et al., First Observation of Carbon Aggregate Ions >C <sub>60</sub> <sup>+</sup> by Laser Desorption Fourier Transform Mass Spectrometry, <u>J. Phys. Chem.</u> , 93, 1989, pp. 1184-1187					
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OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)							
	AP	Somerville et al., An Astronomical Search for the Molecule C <sub>60</sub> , <u>Mon. Nat. R. Ast. Soc.</u> , 240, 1989, Short Communication, pp. 41p-46p					
	AR	Spitsyn, B.V., et al., Vapor Growth of Diamond on Diamond and Other Surfaces, <u>Journal of Crystal Growth</u> , 52, 1981, pp. 219-226					
	AS	Stankevich et al., The Structural Chemistry of Crystalline Carbon: Geometry, Stability, and Electronic Spectrum, <u>Russian Chemical Reviews</u> , 53(7), 1984, pp. 640-655					
	AT	Stanton et al., Normal Vibrational Modes of Buckminsterfullerene, <u>J. Phys. Chem.</u> , 92, 1988, pp. 2141-2145					
	AU	Stone et al., Theoretical Studies of Icosahedral C <sub>60</sub> and Some Related Species, <u>Chemical Physics Letters</u> , 128(5)(6), 1986, pp. 501-503					
	AV	Taylor et al., Isolation, Separation and Characterization of the Fullerenes C <sub>60</sub> and C <sub>70</sub> : The Third Form of Carbon, <u>J. Chem. Soc., Chem. Commun.</u> , 1990					
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<b>OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)</b>							
	AP	Vinokur et al., Measured Extinction Efficiency of Graphite Smoke in the Region 1200-6000A, <u>Nature Physical Science</u> , 243, 1973, pp. 50-51					
	AR	Wales, Closed-Shell Structures and the Building Game, <u>Chemical Physics Letters</u> , 141(6), 1987, pp. 478-494					
	AS	Weeks et al., Rotation-Vibration Spectra of Icosahedral Molecules. II. Icosahedral Symmetry, Vibrational Eigenfrequencies, and Normal Modes of Buckminsterfullerene, <u>J. Chem. Phys.</u> , 90(9), 1989, pp. 4744-4771					
	AT	Weiss et al., Photophysics of Metal Complexes of Spheroidal Carbon Shells, <u>J. Am. Chem. Soc.</u> , 110, 1988, pp. 4464-4465					
	AU	Weltner, Jr., et al., Carbon Molecules, Ions and Clusters, <u>Chem. Rev.</u> , 89, 1989, pp. 1713-1747					
	AV	Wilcox, Jr., Extraction with Solvents, <u>Experimental Organic Chemistry</u> , pp. 79-80					
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OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)							
	AP	Williams, Close Packing of Spheres, <u>J. Chem. Phys.</u> 87(7), 1987, pp. 4206-4211					
	AR	Wu et al., Vibrational Motions of Buckminsterfullerene, <u>Chemical Physical Letters</u> , 137(3), 1987, pp. 291-294					
	AS	Yang et al., Ups of buckminsterfullerene and other Large clusters of Carbon, <u>Chemical Physics Letters</u> , 139(3)(4), 1987, pp. 233-238					
	AT	Yang et al., Ups of a 2-30-Atom Carbon Clusters:Chains and Rings, <u>Chemical Physics Letters</u> , 144(5)(6), pp. 431-436					
	AU	Zhang et al., Reactivity of Large Carbon Clusters:Spheroidal Carbon Shells Their Possible Relevance to the Formation and Morphology of Soot, <u>The Journal of Physical Chemistry</u> , 90(4), 1986, pp. 525-528.					
	AV						
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